AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person:	Theo Provencio
Email Address:	tprovencio@cityofporthueneme.org
Telephone | Ext.:	805-986-6651
Name of City / Utility:	Port Hueneme Water Department
City/Town/Municipality:	Port Hueneme
State / Province:	California (CA)
Country:	USA
Year:	2019 Calendar Year
Audit Preparation Date:	9/28/2020
Volume Reporting Units:	Acre-feet
PWSID / Other ID:	5610009

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

- Value can be entered by user
- Value calculated based on input data
- These cells contain recommended default values

Use of Option (Radio) Buttons: Pcnt: 0.25% Value:

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions
The current sheet. Enter contact information and basic audit details (year, units etc)

Reporting Worksheet
Enter the required data on this worksheet to calculate the water balance and data grading

Comments
Enter comments to explain how values were calculated or to document data sources

Performance Indicators
Review the performance indicators to evaluate the results of the audit

Water Balance
The values entered in the Reporting Worksheet are used to populate the Water Balance

Dashboard
A graphical summary of the water balance and Non-Revenue Water components

Grading Matrix
Presents the possible grading options for each input component of the audit

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

Definitions
Use this sheet to understand the terms used in the audit process

Loss Control Planning
Use this sheet to interpret the results of the audit validity score and performance indicators

Example Audits
Reporting Worksheet and Performance Indicators examples are shown for two validated audits

Acknowledgements
Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: Port Hueneme Water Department (5610009)
Reporting Year: 2019 (1/2019 - 12/2019)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ----------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

		Volume		Pcnt:	Value:	
Volume from own sources:	n/a	0.000	acre-ft/yr			
Water imported:	7	1,806.430	acre-ft/yr	3		acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr			acre-ft/yr
WATER SUPPLIED:		**1,806.430**	acre-ft/yr			

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

		Volume		Pcnt:	Value:	
Billed metered:	6	1,704.380	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	n/a	0.000	acre-ft/yr			
Unbilled unmetered:	5	1.690	acre-ft/yr		1.690	acre-ft/yr
AUTHORIZED CONSUMPTION:		**1,706.070**	acre-ft/yr			

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption) **100.360** acre-ft/yr

Apparent Losses

		Volume		Pcnt:	Value:	
Unauthorized consumption:		4.516	acre-ft/yr	0.25%		acre-ft/yr
Customer metering inaccuracies:	3	25.955	acre-ft/yr	1.50%		acre-ft/yr
Systematic data handling errors:		4.261	acre-ft/yr	0.25%		acre-ft/yr
Apparent Losses:		**34.732**	acre-ft/yr			

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	**65.628**	acre-ft/yr
WATER LOSSES:	**100.360**	acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:	**102.050**	acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	7	47.3	miles
Number of active AND inactive service connections:	9	5,846	
Service connection density:		124	conn./mile main
Are customer meters typically located at the curbstop or property line?		Yes	
Average length of customer service line:			(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	7	45.0	psi

COST DATA

Total annual cost of operating water system:	10	$5,524,411	$/Year	
Customer retail unit cost (applied to Apparent Losses):	5	$3.80	$/100 cubic feet (ccf)	
Variable production cost (applied to Real Losses):	6	$760.52	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 64 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Water Imported
2: Customer metering inaccuracies
3: Billed metered

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

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Water Audit Report for: **Port Hueneme Water Department (5610009)**
Reporting Year: **2019** **1/2019 - 12/2019**

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 64 out of 100 *****

System Attributes:

	Apparent Losses:	34.732	acre-ft/yr
+	Real Losses:	65.628	acre-ft/yr
=	**Water Losses:**	**100.360**	acre-ft/yr
?	Unavoidable Annual Real Losses (UARL):	57.10	acre-ft/yr
	Annual cost of Apparent Losses:	$57,491	
	Annual cost of Real Losses:	$49,911	Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	5.6%	
	Non-revenue water as percent by cost of operating system:	2.0%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	5.30	gallons/connection/day
	Real Losses per service connection per day:	10.02	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.22	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	65.63	acre-feet/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	1.15	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software:
User Comments

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:	

Audit Item	Comment
Volume from own sources:	No City water system sources were used.
Vol. from own sources: Master meter error adjustment:	
Water imported:	"Port Hueneme Water Agency Pipeline Water Usage By Month" report for calendar year for CITY OF PORT HUENEME.
Water imported: master meter error adjustment:	Estimated percentage. Used same a prior year. PHWA initiated a program to replace all of their meters every 3 years. Signal calibration performed annually. PHWA is improving record management of signal calibration.
Water exported:	
Water exported: master meter error adjustment:	
Billed metered:	Total from (last year) Monthly Demand and Meter Count Classification spreadsheet. See Evelia. (note: meters only changed out when complete fail or customer request.)
Billed unmetered:	
Unbilled metered:	

Audit Item	Comment
Unbilled unmetered:	Fire Hydrant flushing or knock downs, main breaks and service leaks.
Unauthorized consumption:	
Customer metering inaccuracies:	Estimated at 1.00 %. Most meters are approximatly 10 yeasr old. Meters are replaced when customer complain occurs or when meters are not working.
Systematic data handling errors:	Default 0.25%
Length of mains:	Data from 2011 Master Plan. H T E software is used to manage valves, hydrants and meters asstes. As-built documented for pipes.
Number of active AND inactive service connections:	Data from " 2019 Monthly Demand and Meter Count Classification".
Average length of customer service line:	
Average operating pressure:	Pressure recorders at Wells 4A and 6A.
Total annual cost of operating water system:	Budget 441 report for 18/19 (First 6 months) and 19/20 (Second 6 Months). Annual 3rd party and internal staff audits performed.
Customer retail unit cost (applied to Apparent Losses):	Current rate structures, New rates starting 2020
Variable production cost (applied to Real Losses):	COPH variable cost from "Fixed and variable Rates (Costs) for FY 2019-20. Contact Tonie Alix at Finance.

AWWA Free Water Audit Software: Water Balance

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Water Audit Report for:	Port Hueneme Water Department (5610009)	
Reporting Year:	2019	1/2019 - 12/2019
Data Validity Score:	64	

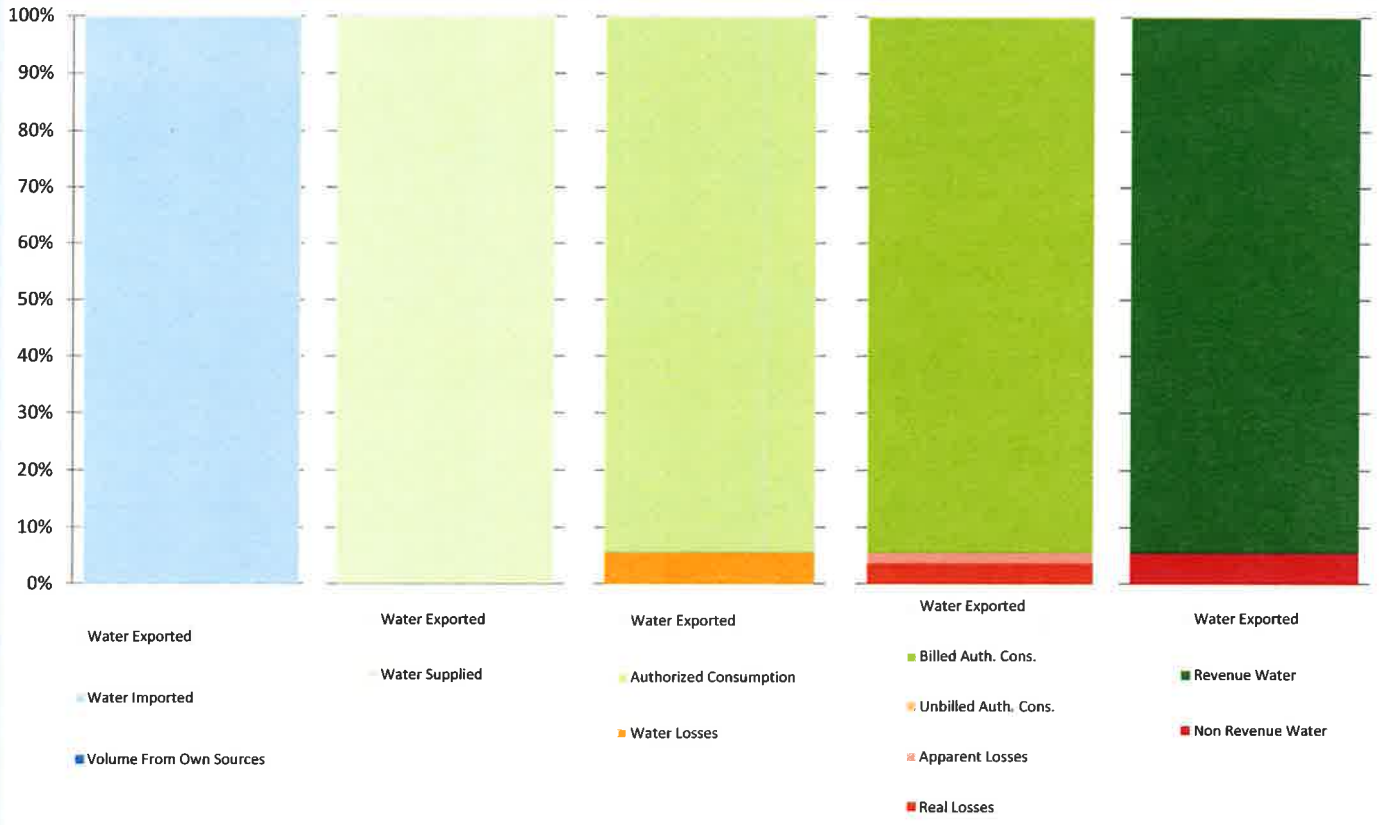
		Water Exported 0.000			Billed Water Exported	Revenue Water 0.000
Own Sources (Adjusted for known errors) 0.000	System Input 1,806.430	Water Supplied 1,806.430	Authorized Consumption 1,706.070	Billed Authorized Consumption 1,704.380	Billed Metered Consumption (water exported is removed) 1,704.380	Revenue Water 1,704.380
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 1.690	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 102.050
					Unbilled Unmetered Consumption 1.690	
			Water Losses 100.360	Apparent Losses 34.732	Unauthorized Consumption 4.516	
					Customer Metering Inaccuracies 25.955	
					Systematic Data Handling Errors 4.261	
Water Imported 1,806.430				Real Losses 65.628	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

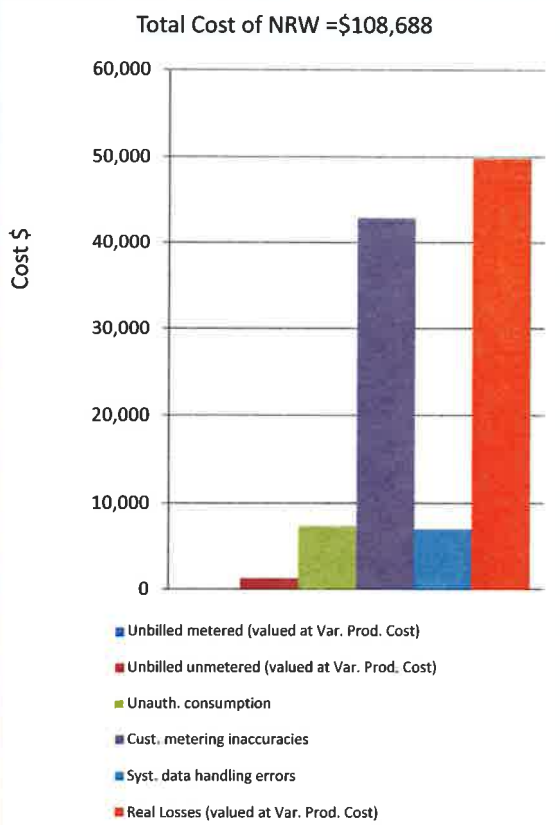
AWWA Free Water Audit Software:
Dashboard

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for: Port Hueneme Water Department (5610009)
Reporting Year: 2019 | 1/2019 - 12/2019
Data Validity Score: 64

○ Show me the VOLUME of Non-Revenue Water
◉ Show me the COST of Non-Revenue Water





AWWA Free Water Audit Software:
Determining Water Loss Standing

WAS v5.0

Water Audit Report for: Port Hueneme Water Department (5610009)
Reporting Year: 2019 | 1/2019 - 12/2019
Data Validity Score: 64

Water Loss Control Planning Guide

Functional Focus Area	Water Audit Data Validity Level / Score				
	Level I (0-25)	**Level II** (26-50)	**Level III** (51-70)	**Level IV** (71-90)	**Level V** (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service

For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.

Once data have been entered into the Reporting Worksheet, the performance indicators are automatically calculated. How does a water utility operator know how well his or her system is performing? The AWWA Water Loss Control Committee provided the following table to assist water utilities is gauging an approximate Infrastructure Leakage Index (ILI) that is appropriate for their water system and local conditions. The lower the amount of leakage and real losses that exist in the system, then the lower the ILI value will be.

Note: this table offers an approximate guideline for leakage reduction target-setting. The best means of setting such targets include performing an economic assessment of various loss control methods. However, this table is useful if such an assessment is not possible.

General Guidelines for Setting a Target ILI (without doing a full economic analysis of leakage control options)

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
1.0 - 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term
>5.0 - 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		